Data Center News:

DC power worries data center planner

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United Air Lines Inc. isn't sure if using DC power for a new data center will lead to a safe landing.

The Chicago-based company is building the facility in Denver to consolidate disaster recovery operations and direct current is on the radar because of its reputed reliability and better energy efficiency. But there are concerns. For one, not all the hardware it needs is DC-compatible. And having grown accustomed to the power and cooling redundancy of AC systems, it's worried about a single DC-power input.

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DC power sparks interest

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The skeleton of the 2,500-square-foot facility is built, and the raised floor is in. Tom Songaila, manager of data center planning and business resumption for United, said he wants to expand to 5,000 square feet in five years, but United has to get the first 2,500 square feet operational, which it's expecting to do by late 2007.

Before that can happen, Songaila has to decide if DC power is a good fit in the facility so that engineering drawings can be completed.

DC-power research begins

Songaila said the idea for DC power came from the company's chief information officer (CIO), who had read a magazine article on the topic.

To start his research, Songaila went first to Swanson Rink Inc., a Denver-based construction design company that, according to its Web site, has helped design more than 2 million square feet of data center raised floor. But according to Songaila, the company didn't have a lot of experience building DC-powered data centers.

That's not surprising.

"There are almost no data centers powered by DC right now," said Ron Hughes, president of the California Data Center Design Group. "It's almost a theory more than a practice."

Yet, DC power is nothing new. Telecommunications companies have been using it to power their network operations centers (NOCs) for decades, mainly so they could store power in battery banks if external power sources cut out. That's why, when there's a storm, the power might go out but your phone still works.

Cheaper to run, more expensive to buy

The idea of powering data center equipment with direct current, or DC, has been generating interest in the industry, especially among larger data centers that can justify the initial investment to possibly save money down the line.

They're just cheaper to run, that's the beauty of them. You're not having to deal with the AC to DC conversion inside the boards.
Richard Sneider managing partner, InterUnity Group, on DC-powered servers

William Tschudi, project manager in Lawrence Berkeley National Laboratory's environment energy technologies division, said companies could see a 10% to 20% energy savings if they adopt DC power over alternating current, or AC. Lawrence Berkeley has been running a demonstration project in California looking at the energy savings possible by using DC power and has even created a power calculator that IT shops can fiddle around with.

How can it save money? When the utility company sends electricity to a customer, it's in AC because it's easier to distribute in that form over long distances. The AC is converted to DC at the power distribution unit, converted back to AC to begin its path to the servers and finally converted back again to DC one more time by each individual server.

In a DC system, there is only one conversion at the beginning, from AC to DC. Fewer conversions translates into fewer opportunities for power and energy loss. DC servers also don't have power supplies built in for the extra conversion, so they can take less space in the data center.

"They're just cheaper to run, that's the beauty of them," said Richard Sneider, managing partner of Concord, Mass.-based research firm InterUnity Group. "You're not having to deal with the AC to DC conversion inside the boards."

DC servers, however, are not cheaper to buy, despite the

fact that they lack a power supply. The same goes for power supplies. Songaila found that a DC uninterruptible power supply (UPS) would cost 20% to 40% more than for AC.

DC servers scarce

Nor is DC hardware readily available. Songaila went to the vendors -- Sun Microsystems Inc., Cisco Systems Inc., Hewlett-Packard Co. (HP), IBM, Hitachi Data Systems Inc. (HDS) -- to see what DC equipment they could offer him. He found a mixed bag.

"Sun no problem, Cisco no problem, HP there are some issues, IBM even more issues," he said. One of the biggest stumbling blocks, however, was that Hitachi couldn't provide him with DC storage hardware. "That's the hardest thing for me to swallow. Without storage, there's not a lot that I can do."

So Songaila switched gears and realized he might have to build a hybrid data center. Some equipment would use AC power, some DC. Although he doesn't know of any other data centers that have done this, he said he already has a 100 kVA AC UPS that could work in the data center alongside DC power equipment.

Running both AC and DC power would use more components and therefore consume more space, Songaila said. But the hope is that the AC equipment can eventually be retired, and the data center can operate entirely on DC.

Single DC power supply causes concern

His next challenge is to overcome his own anxieties about having a single DC power source.

United is building the Denver facility as a Tier-4, a designation by The Uptime Institute for a data center that is basically immune to downtime. In the past, Songaila has done this by having no single point of failure. The data center would have redundant UPSs, redundant cooling, redundant generators and redundant power feeds into the AC servers.

But building in that level of redundancy with DC power would be up to 40% more expensive, Songaila found, because of higher equipment costs. Songaila has also spoken to DC-power advocates who claim you don't need redundancy. Because there are fewer components in DC servers and power supplies, there are fewer parts that can break down.

"They say it would be more redundancy than the phone companies provide," he said. But doing that requires a leap of faith. "In order to do this, I need to back off my architectural idea of no single point of failure."

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